OCEANOGRAPHICAL INVESTIGATIONS IN SOUTH AFRICAN WATERS.[1]

THE observations published in the pamphlet of which the title is given below are the first of a series undertaken in connection with the fishery investigations recently inaugurated at the Cape. They include observations made in March and April, 1900, by the Government steamer *Pieter Faure*, consisting of temperatures and analyses of water samples from points to the west of the Cape Peninsula; observations of surface temperature made on February 11 to 18 and March 3, 1898, at intervals of about five miles, to a distance of fifty miles west of Cape Town, and on a voyage to St. Helena Bay; daily records of air and sea temperatures taken at Robben Island in Table Bay, and at Roman Rock in Simon's Bay during the three years 1898–1900; temperatures and analyses of water samples taken at intervals on passages of the Government trawler between Table Bay and Simon's Bay, and of mail steamers between Table Bay and Cape Hangklip. An extended series of observations is now in progress over the whole of the South African coast.

The investigation of which this forms the beginning is, without doubt, one of the most valuable and important of its kind ever attempted. The preliminary international work which has been carried on in the North Sea and the Baltic during the last nine years, and is now about to take definite shape as an organised system of research, has shown that adequate hydrographical observations are of the utmost value, not only in themselves as determining the circulation of waters, but in their relation to climatology and to fishery work of all kinds. Similar research in South African waters has the additional interest of dealing with a region where the current system is not only unusually complex, but is very strongly and clearly developed; and the fact that the services of a special ship are available renders the opportunity of studying the relations existing amongst the different current elements unique.

Unfortunately, however, the methods employed in the present series of observations seem to leave much to be desired. Nothing is said about the thermometers employed in taking temperatures, or about their corrections, and the observations at different depths are made with little reference to the changes of temperature; many of them are unnecessary, and there are frequent gaps which leave the true form of the temperature curve undetermined. The curves and sections shown suggest that the boundaries between masses of water are often very sharply defined, and that a high degree of accuracy, in the instruments employed, in their working, and in the determinations of ship's position, is essential. The laboratory analyses of the samples of water collected are still more unsatisfactory. In most cases the chlorines have been determined, by a method not stated, and the results are, for a reason left unexplained, expressed in grains per gallon, thereby rendering them incomparable with any other determinations except those of county analysts. A study of the chlorine values in relation to their geographical distribution does not inspire confidence in the accuracy of the determinations, and the uncertainty increases on comparison with the values in columns headed "specific gravity" and "sulphuric oxide." No account is given of the methods by which the specific gravity determinations have been made, nor is there any statement as to the temperatures to which they are referred, and we find, for example, such records as the following :—

Temp. °F.	Specific gravity.	Chlorine in grains per gallon
63·0	1·02712	1412·0
63·0	1·02696	1414·5
63·0	1·02700	1409·5
63·0	1·02700	1422·0
63·0	1·02696	1402·0
63·0	1·02723	1414·5

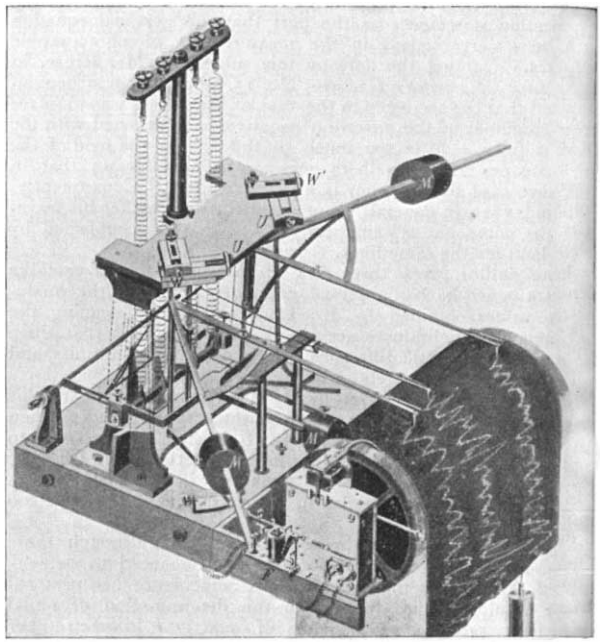
The determinations of sulphuric oxide, which are, presumably, also stated in grains per gallon, give, on a series of averages (p. 215), values of the chlorine ratio ranging from 11·8 to 12·2, and on a single set (p. 213) from 10·4 to 13·1. Such determinations fall distinctly short of the standard required for work of the kind, and as there is no continuity in the variations, we must regard the whole of the tabular matter in the paper with considerable suspicion. Finally, we note that in a region where meteorological observations are of the greatest interest and value, a specially equipped scientific expedition makes its barometer readings "direct from Aneroid."

We direct attention to these points because the importance of the work imperatively requires that it should be thoroughly well done when there is an opportunity of doing it at all. The detailed reports on methods, published by participants in the international work already mentioned, and the tables produced by Knudsen under the direction of the International Committee, leave no excuse for doing it otherwise.

[1] "Cape of Good Hope. Department of Agriculture. Marine Investigations in South Africa. Observations on the Temperature and Salinity of the Sea around the Cape Peninsula." By J. D. F. Gilchrist, M.A., B.Sc., Ph.D.

A NEW FORM OF SEISMOGRAPH.

IN the *Bollettino della Societa Sismologica Italiana* (vol. vii. No. 7), Dr. G. Agamennone gives a detailed description of a seismograph, consisting of two horizontal pendulums each of which carries a mass of 1½ kg. and a vertical spring seismograph with a mass of 2 kg., which write their records side by side on a band of smoked paper 25 cm. broad.



A reference to the accompanying figure shows the manner in which these three well known pieces of apparatus, which stand on a bed plate 55 cm. square, are arranged. The screws W alter the inclination of the vertical axes of the horizontal pendulums and hence their period. The screws U are to give horizontal adjustment for the same. By shifting the position of the weights MM, assuming the same to coincide with centres of oscillation, the multiplication of the writing pointers, which are at the extremities of arms attached at 45° to those carrying the weights, may be made twice that of the movement of the ground. It is almost needless to remark that with so small an amplification the instrument is only intended to record earthquakes which can be felt and are severe. When such an earthquake occurs, the electromagnet F is brought into action to release the clockwork, and the smoked paper then moves beneath the writing pointers at a rate of 25 metres per hour—a speed sufficiently high to give an open diagram of vibrations with periods of 1/10th second. But is it not desirable to record vibrations with a frequency greater than 10 per second, and in addition to obtain a trace of the preliminary tremors? Dr. A. Cancani, who uses films which move continuously at a rate of 6 metres per hour, obtains something to show the latter, but the rate is not sufficiently high to give open records of movements the period of which is very short. Then again, it must not be overlooked that the large movements of severe earthquakes are undulatory in character, and both horizontal pendulums and vertical spring

seismographs are simply swung from side to side or up and down under the influence of the tilting of their supporting bed plate.

Dr. Agamennone's new arrangement will no doubt give records which are valuable, but the seismograph which is suitable to record all forms of earthquake motion has yet to be designed. J. M.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—During the long vacation, beginning on July 7, courses of lectures will be given as follows:—Mathematics and astronomy, by Sir Robert Ball, Mr. Richmond, and Mr. Coates; practical histology, by Dr. Hill and Dr. Barclay-Smith; pharmacology, by Prof. Bradbury and Dr. Dixon; osteology, by Dr. Barclay-Smith; geology, by Mr. Marr; crystallography, by Mr. Hutchinson; chemistry, by Mr. Fenton; metallurgy, by Mr. Dootson; analysis of foods, &c., by Mr. Purvis; practical physics, by demonstrators in the Cavendish Laboratory; pathology and morbid histology, by Prof. Woodhead and Mr. Strangeways-Pigg; bacteriology and preventive medicine, by Dr. Nuttall; animal parasites, by Mr. Shipley; medicine, by Dr. Humphry and Dr. Lloyd-Jones; surgery, by Dr. Griffiths and Mr. Wherry; hygiene, by Dr. Anningson.

THE Nature-Study Exhibition to be held at the Royal Botanic Gardens will be opened on July 23 by the Duchess of Devonshire, the Duke of Devonshire being in the chair. A number of interesting conferences have been arranged in connection with the exhibition. Among the subjects to be brought forward in addresses and short papers are:—"The Study of Nature," by Lord Avebury, F.R.S.; "Seasonal Studies in Natural History," by Prof. J. Arthur Thomson; "Nature-Study in Elementary Schools," by Prof. C. Lloyd-Morgan, F.R.S.; "Visual Instruction," by Prof. Bickmore; "Nature-Study in Colleges and Higher Schools," by Prof. Miall, F.R.S.; "Plant-Life as Nature-Study," by Mr. Scott Elliott; "School Gardens," by Mr. T. G. Rooper; "Geology as a Branch of Nature-Study," by Prof. Grenville Cole; "The Training of Teachers in Nature-Study," by the Rev. Canon Steward; and "The Relation of Nature-Study to School Work and to the Home," by Sir Joshua Fitch.

MANUFACTURERS and others interested in paper-making have been invited to give their support to a scheme for the establishment of special scientific and technical instruction in connection with this industry at the Battersea Polytechnic. It is suggested that the scheme should provide for both day courses (extending over two or three years) and evening classes for employés who cannot be spared during the day; and that it should include thorough and systematic scientific and technical instruction (theoretical and practical) in chemistry and engineering so far as is necessary for the science of the subject and helpful for its practical carrying out, combined with experimental work in a laboratory or workshop specially fitted up for the actual manufacture of paper and complete testing of the finished product. Such a department when organised would naturally become a centre of research in questions connected with the paper-making and cellulose industries. The circular states that the paper-makers in the North of England have taken up the question in a very practical way and are supporting one of the large technical colleges, where they have put down a small model paper machine, which has been made in Germany, no English manufacturer being found willing to undertake the making of it.

THE Calendar of the Tokyo Imperial University for 1901-1902 shows that provision is made for the study of many branches of pure and applied science. In the College of Engineering, practical work and excursions are arranged outside the College, in addition to the laboratory work. In connection with the College of Science there are museums of zoology, geology and anthropology, and a herbarium. At the Astronomical Observatory the principal work carried on consists of observations of position and the compilation of almanacs. The director of the Botanic Garden is prepared to exchange seeds with foreign botanists or institutions. Earth-movements are continually studied at the seismological observatory, and on the occurrence of a great earthquake an expedition is at once sent to make all possible investigations. The Marine Biological Station is situated on the extremity of the peninsula jutting out between the Bay of Sagami and the Gulf of Tokyo; it thus has access to localities rich in remarkable animal forms. Though the station is primarily intended for the use of instructors and students of the University, its facilities are extended to other persons who are qualified to avail themselves of the opportunities of research there afforded. The College of Agriculture is a very active part of the University, and the numerous investigations carried on in the experimental farm have often been noticed in NATURE. Connected with the zoological laboratory of this department are four buildings for the study of silk-worm culture, containing all the apparatus required for experiment and research. Rooms are also provided for special work in the study of the pebrine disease—the most formidable obstacle to silk-worm culture.

SEVERAL matters of interest are mentioned in the report of the Council of the City and Guilds of London Institute, a copy of which has been received. Important extensions have been made at the Central Technical College, among them being additions to the electrical department in order to bring it up to the present requirements of the electrical industry. The total cost of the extension of the College, including equipment and all structural additions and alterations, both for the College and for the department of technology, is estimated at 10,000*l.*, and the additional annual cost at about 1000*l.* The Institute has recently received from the University of London an offer to devote 1425*l.* a year to the department of engineering in the Central Technical College, subject to certain conditions. This amount is the larger part of a grant made to the University by the Technical Education Board of the London County Council for improving and extending the teaching of engineering in the metropolis. It involves the appointment of the professor of engineering of the College as a "transferred teacher" of the University, and it is a recognition by the University that the College occupies the foremost position among engineering colleges in the metropolis. The organisation and work of the College have not otherwise been affected by reason of its inclusion as a school of the University. At the Technical College, Finsbury, the only change recorded in the educational scheme is the addition of a laboratory class in electrochemistry for second-year chemical students. The development of the use of electricity in the chemical industries has shown the necessity of making more complete the training which has been given to chemical students in this branch of physics.

A COPY of an address on the University of London, delivered by Dr. E. H. Starling, F.R.S., at University College, London, on June 5, has been received. Some of the prominent points brought forward in the address have already been described (p. 164), and are the same as those stated in these columns on more than one occasion. What are wanted in London are great University centres, adequate to the higher intellectual needs of the seven million inhabitants. The main features of the University of London sketched by Prof. Starling are as follows:—"Under the control of the Senate, but administered by local councils appointed by the Senate, would be these four or more centres, by which the main teaching and research of the University in all Faculties would be carried out. In addition to these centres there would be a number of *schools of the University* which would preserve their autonomy, but would direct their teaching according to the requirements of the University. Such schools would be essentially post-graduate in character, in that it would be their office to graft on the general training in method, acquired within the walls of the University itself, the special professional training necessary to fit the man for the pursuit of medicine, law, commerce, administration, &c. The relation of the Polytechnics to the University will require careful consideration. In any policy decided upon, it must be remembered that the whole object is the improvement of the mental training of our fellow citizens and not the distribution of degrees. It is vital to the welfare of the country that as many as possible of its inhabitants should have received a thorough university training, and be competent to use their brains in solution of the new problems which must continually meet them, whatever their trade or profession. The whole progress of the nation depends on the mental equipment of its members. At no time more than the present have the words of Bacon on this subject been so full of counsel: 'If any man thinks philosophy and universality to be idle studies, he doth not consider that all professions are from thence served and supplied. . . . For if you will have a tree bear more fruit than it used to do, it is not anything you can do to the boughs, but it is the stirring of the earth and putting new mould about the roots that must work it.'"